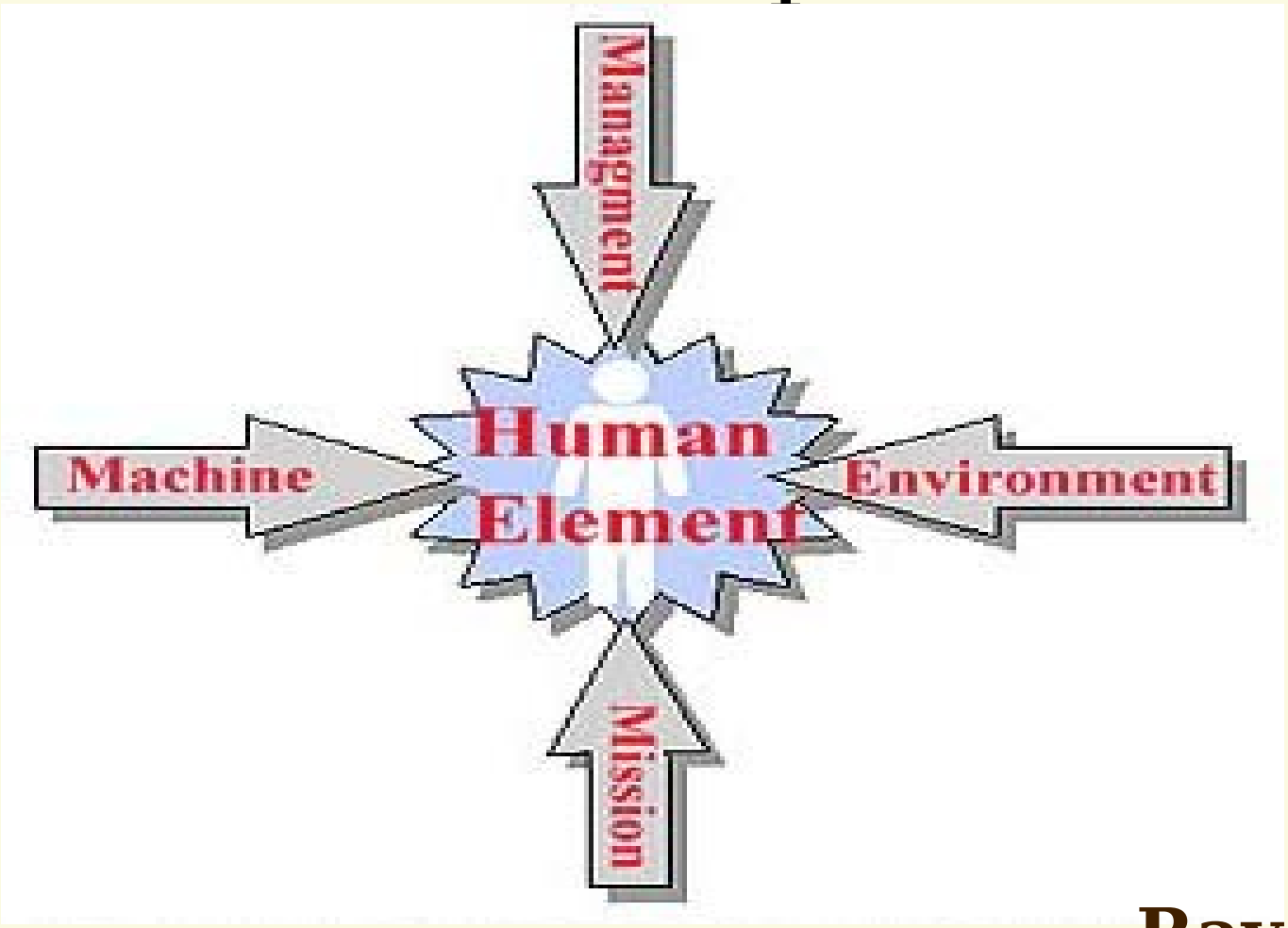
Human Factors from the FAA's Perspective



Ray King

MISTAKES

It Could Be that the Purpose of Your Life Is
Only to Serve as a Warning to Others.

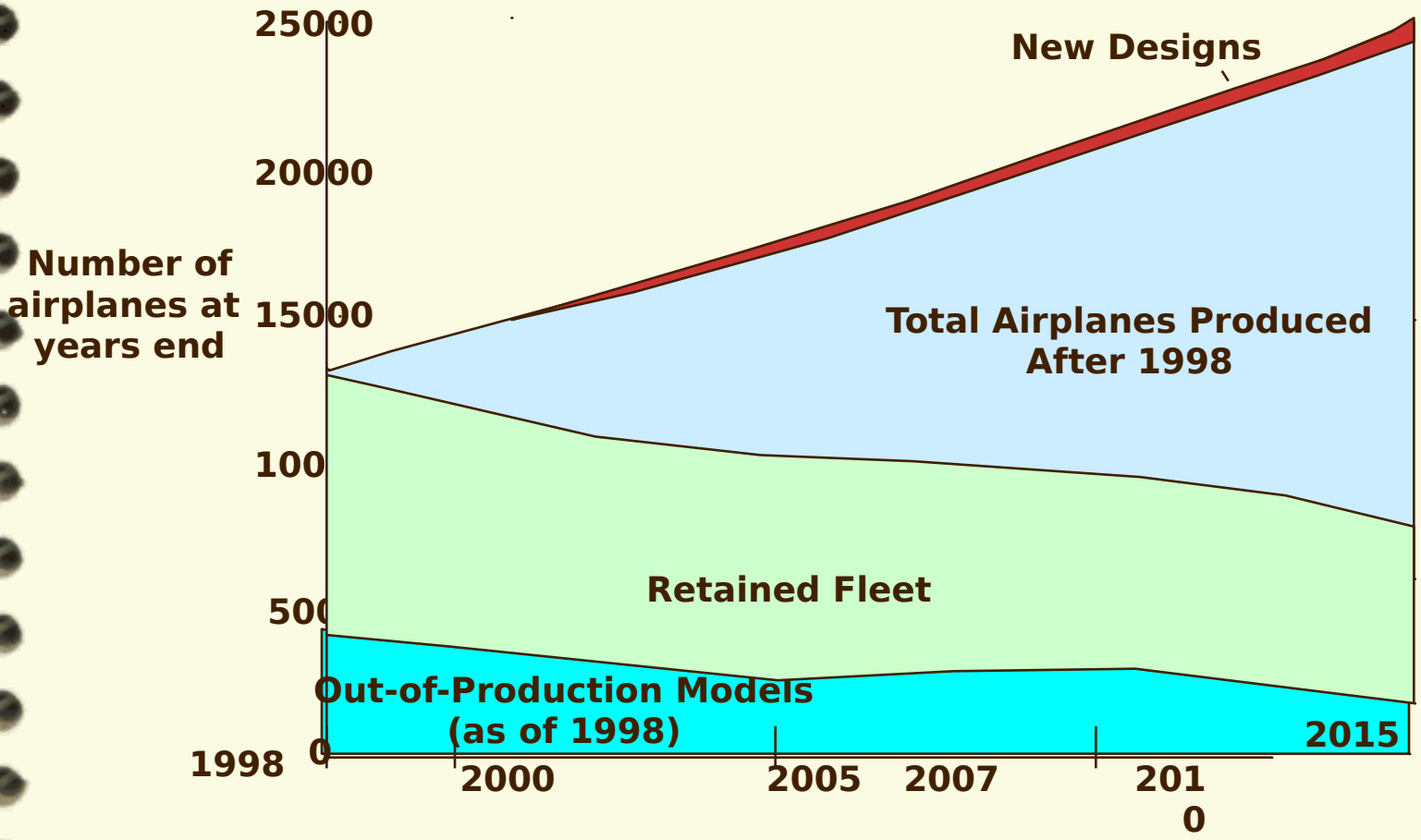
Human Factors from the FAA's Perspective

- FAA charged with safety regulation and enforcement
- NTSB investigates accidents and makes *recommendations* for changes, but the FAA must adopt these recommendations for anything to happen.

There are Other Data Sources for Safety beside Accidents (yup, that's what the FAA calls 'em)

- **Incidents (for example, Aviation Safety Reporting System, ASRS)**
- **Airplane damage**
- **Service difficulties**
- **Flight Oriented Quality Assurance (FOQA)**

Potential for Totally New Designs to Affect Safety is Very Small



The Mandate:

FINAL REPORT
TO
PRESIDENT CLINTON

White House Commission on
Aviation Safety and Security

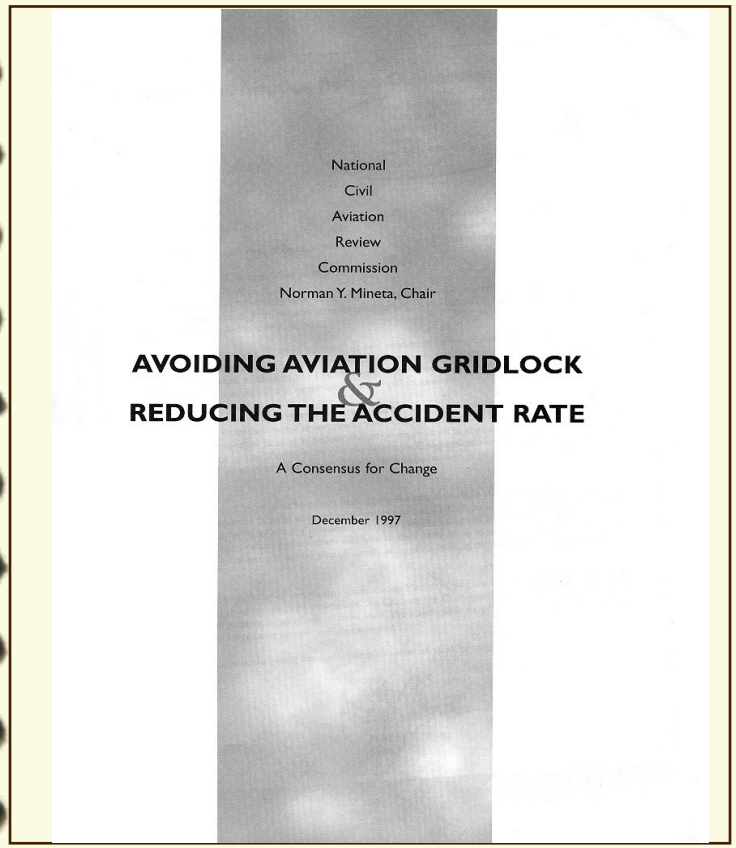
★ ★ ★ ★ ★ ★ ★ ★ ★

VICE PRESIDENT AL GORE, CHAIRMAN

FEBRUARY 12, 1997

1.1 Government and industry should establish a national goal to reduce the aviation fatal accident rate by a factor of five within ten years and conduct safety research to support that goal.

1.2 The FAA should develop standards for continuous safety improvement, and should target its regulatory resources based on performance against those standards



- **FAA and the aviation industry must develop a strategic plan to improve safety, with specific priorities based on <u>objective, quantitative analysis</u> of safety information and data.**

- **Government should expand on their programs to improve aviation safety in other parts of the world.**

Why improve a near-perfect system?

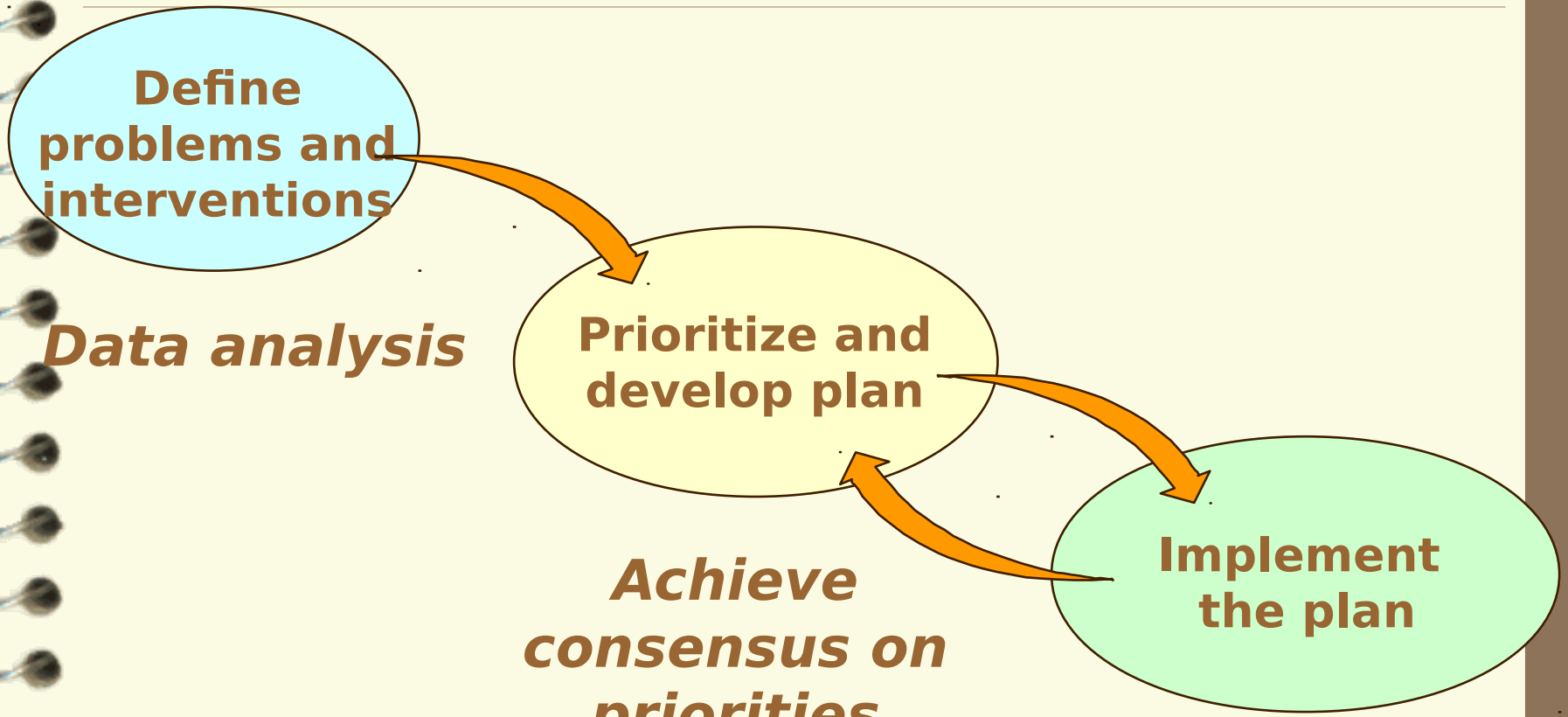
- **<u>Any</u> accident has an impact on the perception of safety in the entire aviation system**
- **The future of aviation will be affected by our ability to maintain or exceed our current level of safety**
  - **If the travelling public perceives the system as unsafe, they will choose alternate forms of transportation**
- **Public perception of risk is greatly influenced after a major accident**
- **Focus our resources on the high-leverage changes that can maintain or exceed the current high level of safety**

Commercial Aviation Safety Team
(CAST)

Joint Safety Analysis Teams
(JSATs)

Joint Implementation Safety Teams
(JSITs)

Industry and Government Working Together



COMMERCIAL AVIATION

GENERAL AVIATION

- Pilot Decisionmaking
- Loss of Control
- Weather
- Controlled Flight Into Terrain
- Survivability
- Runway Incursions

COMMERCIAL AVIATION

- Controlled Flight Into Terrain
- Loss of Control
- Uncontained Engine Failures
- Runway Incursion
- Approach and Landing
- Weather

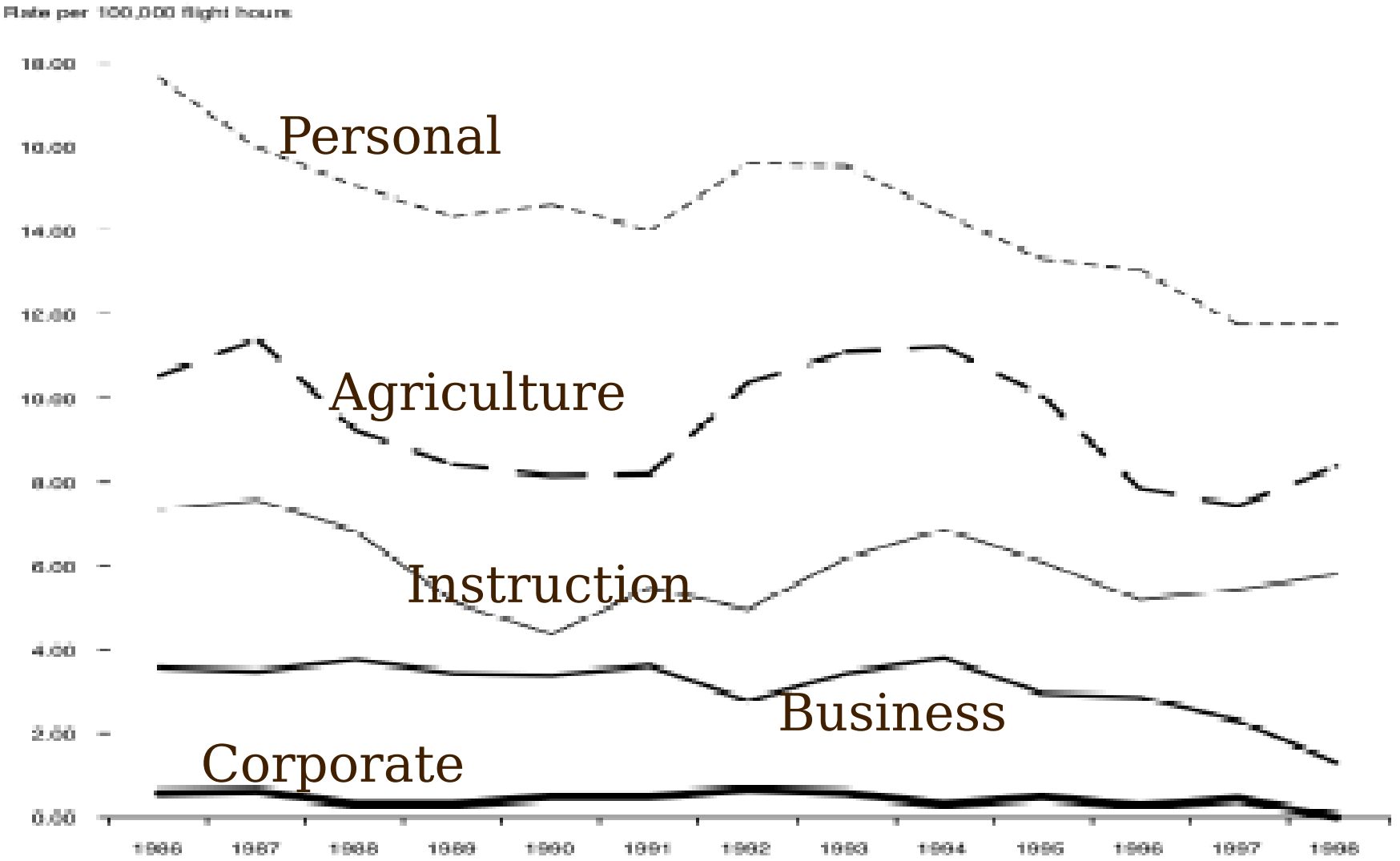
CABIN SAFETY

- Passenger Interference
- Passenger Seat Belt Use
- Carry-on Baggage
- Child Restraint

IMPROVED DATA & ANALYSIS

HUMAN FACTORS IN OPERATIONS & MAINTENANCE

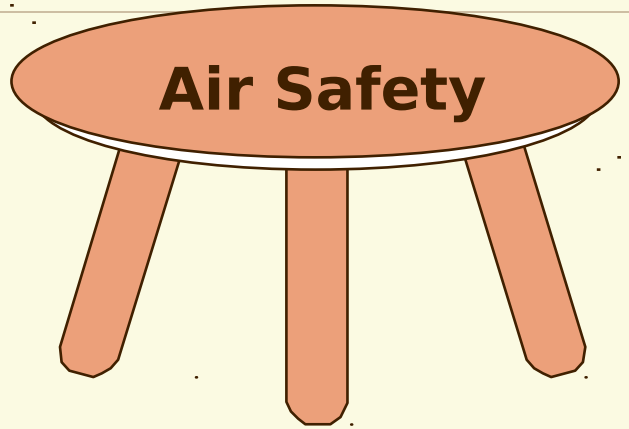
Figure 16: Figure 14: Accident Rates per 100,000 Flight Hours for General Aviation, by Segment, 1986 Through 1998



Source: GAO analysis of NTSB data.

Safety Responsibilities Are Shared

(Safe Airplane + Safe Operation + Safe Infrastructure = Safe Air Travel)



Manufacturers

- Safe airplane design
- Safety enhancing technology development
- Flight and maintenance operations, recommendations, documents, training, and support
- Maintenance planning
- Safety related analysis
- Safety initiatives

Operators

- Operations policy and procedures
- Airplane/pilot publications
- Approved maintenance program
- Maintenance, policy, and procedures
- Maintenance publications
- Safety program
- Training

Government

- Aviation law
- Operations specification
- Rules and regulations
- Inspectors policy, procedures, and training
- Airline policy and procedures requirements
- Safety, health, environmental law, and regulations
- Navigation facilities/operations
- Airport facilities
- Departure enroute, arrival, approach policy, and procedures
- Air traffic control services
- Safety related

Strategy

- Value of Lessons Learned
  - Process is data driven
- Systems Approach
- Common Risk Factors
- Focus on those with Highest Probability of Reoccurrence

Joint Safety Analysis Team (JSAT)

Over 50 individuals representing multiple fields, organizations, and national entities

- Labor unions (ALPA)
- Airlines
- Aircraft manufacturers (Boeing/Airbus)
- FAA (aircraft certification, air traffic, regulatory)
- European Joint Aviation Authority (JAA)
- DoD
- Flight Safety Foundation

JSAT Process

Each subteam assigned several accidents

- Identified Events
- Generated Problem Statements (What) and Contributing Factors (Why)

JSAT Process (Cont.)

- Affixed Standard Problem Statements either from previous JSAT or generate
- Assigned Intervention Strategies, either from previous JSAT or generate

Rating the Interventions

Rated each intervention in the following 3 areas on a 1 (low) to 7 (high) scale:

- Power (In a "Perfect World")
- Confidence (Considering the Real World)
- Applicability (Generalizability)

Prioritizing

Power + Confidence + Applicability = Overall Effectiveness (OE)

- OE score is then used for the final rack and stack, from which recommendations to the CAST are made

A & L JSAT Recommendations

1.) Situational Awareness Technologies

The industry should develop and implement technologies that enhance flight crew awareness of aircraft flight path and position geographically and relative to terrain

A & L JSAT Recommendations (Cont.)

2.) Stabilized Approaches

To address the problems of unstabilized approaches and loss of vertical situational awareness, the industry should develop and implement precision or precision-like approach capability (glidepath guidance) to all runways without established precision approach procedures

A & L JSAT Recommendations (Cont.)

3.) Go Around

To reduce the risk of accidents associated with unstabilized and rushed approaches, airline operators should:

- ✔ Establish policies, parameters, and training to recognize unstabilized approaches and other factors and implement a go-around gate system
- ✔ Institute a true no-fault go-around policy

A & L JSAT Recommendations (Cont.)

Recommendation 3 - Go Around (Cont.)

- Incorporate, in initial and recurrent training, ways to recognize multiple cues that will require a go around
- Ensure that flight crews are trained to think in terms of “I will go around unless…,” rather than “I will land unless…”

A & L JSAT Recommendations (Cont.)

Recommendation 3 - Go Around - Continued

- Enhance ATC training to emphasize dangers of rushed approaches and the performance characteristics of modern jet transports

- Base runway selection on the most current wind available

A & L JSAT Recommendations (Cont)

4.) Standard Operating Procedures

An industry/government team should be established to develop a template for standard operating procedures best practices, including guidance on what SOPs should cover, development methodology, and how to train for, and monitor, procedural compliance.

A & L JSAT Recommendations (Cont)

Recommendation 4 - Standard Operating Procedures (Cont)

- Research should be undertaken to better understand the underlying reasons/causes for procedural non-compliance

A & L JSAT Recommendations (Cont.)

5.) Safety Culture

Airlines/operators *should* and regulatory agencies *must* encourage a culture that enhances safety.

- ✔ Incorporate a company self-audit process and a cost analysis tool regarding the high economic and psychological costs of accidents

A & L JSAT Recommendations (Cont.)

Recommendation 5 - Safety Culture (Cont.)

- Emphasize safe arrivals over timely arrivals and discontinue on-time arrival tracking for airlines. Do not punish missed approaches. Base reward system on something other that completion of a route segment.

A & L JSAT Recommendations (Cont)

Recommendation 5 - Safety Culture (Cont.)

- Allow voluntary removal from flight status due to illness and/or emotional distress. Be sensitive about fatigue and circadian rhythm

- Implement policies regarding crew pairing

- Airlines/Operators should establish a CRM training program and regulators should require and ensure the initial

A & L JSAT Recommendations (Co

Recommendation 5 - Safety Culture (Cont

- Parent Airlines/Operators should adopt a program
to ensure the same level of safety in regional partners

A & L JSAT Recommendations (Cont.)

6.) Operational Feedback

To enable airlines/operators to identify safety issues and trends, monitor procedural compliance and initiate corrective actions prior to accident occurrence, the following interventions should be implemented:

A & L JSAT Recommendations (Co

Recommedation 6 - Operational Feedback (Cont.)

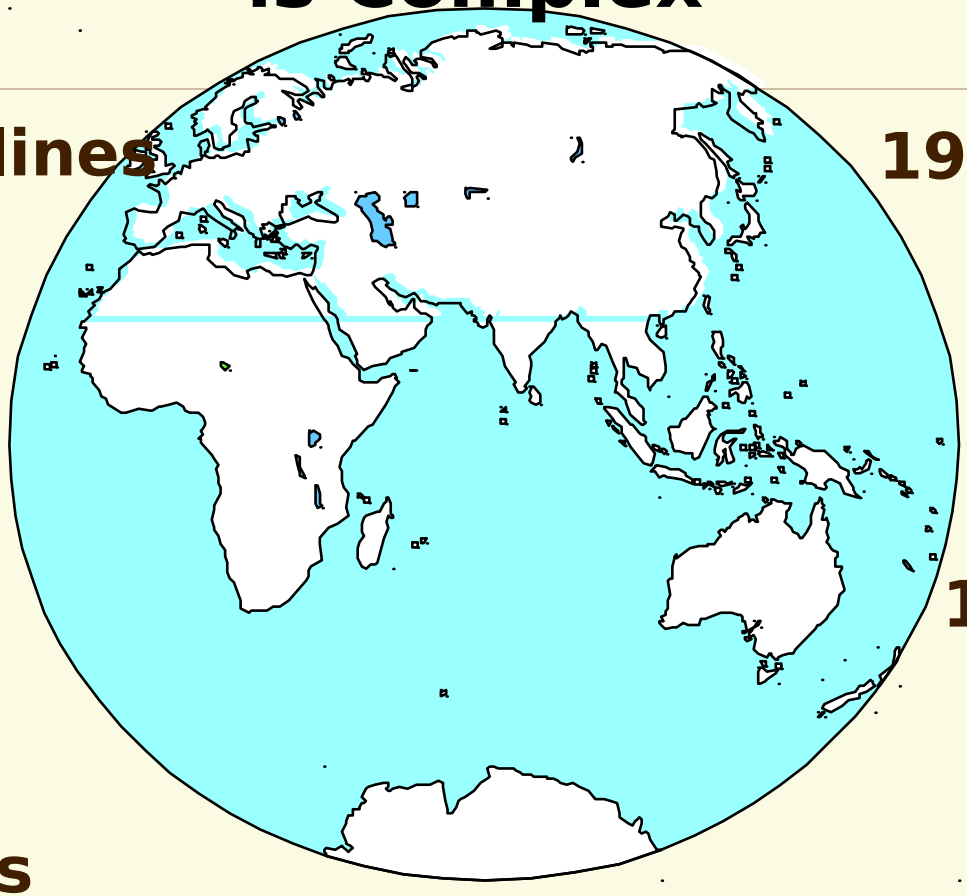
- Airlines/operators should implement Flight Operations Quality Assurance (FOQA) programs

- Airlines/operators and regulators should implement a no-blame safety reporting and data sharing system with appropriate protection from litigation and prosecution.

The Worldwide Aviation Systems is Complex

~745 airlines

190 languages



190 countries

1,350+ major airports

150,000+ flight crew

Over 15,000 airplanes
>12,500 western built
~2,500 eastern built

But…

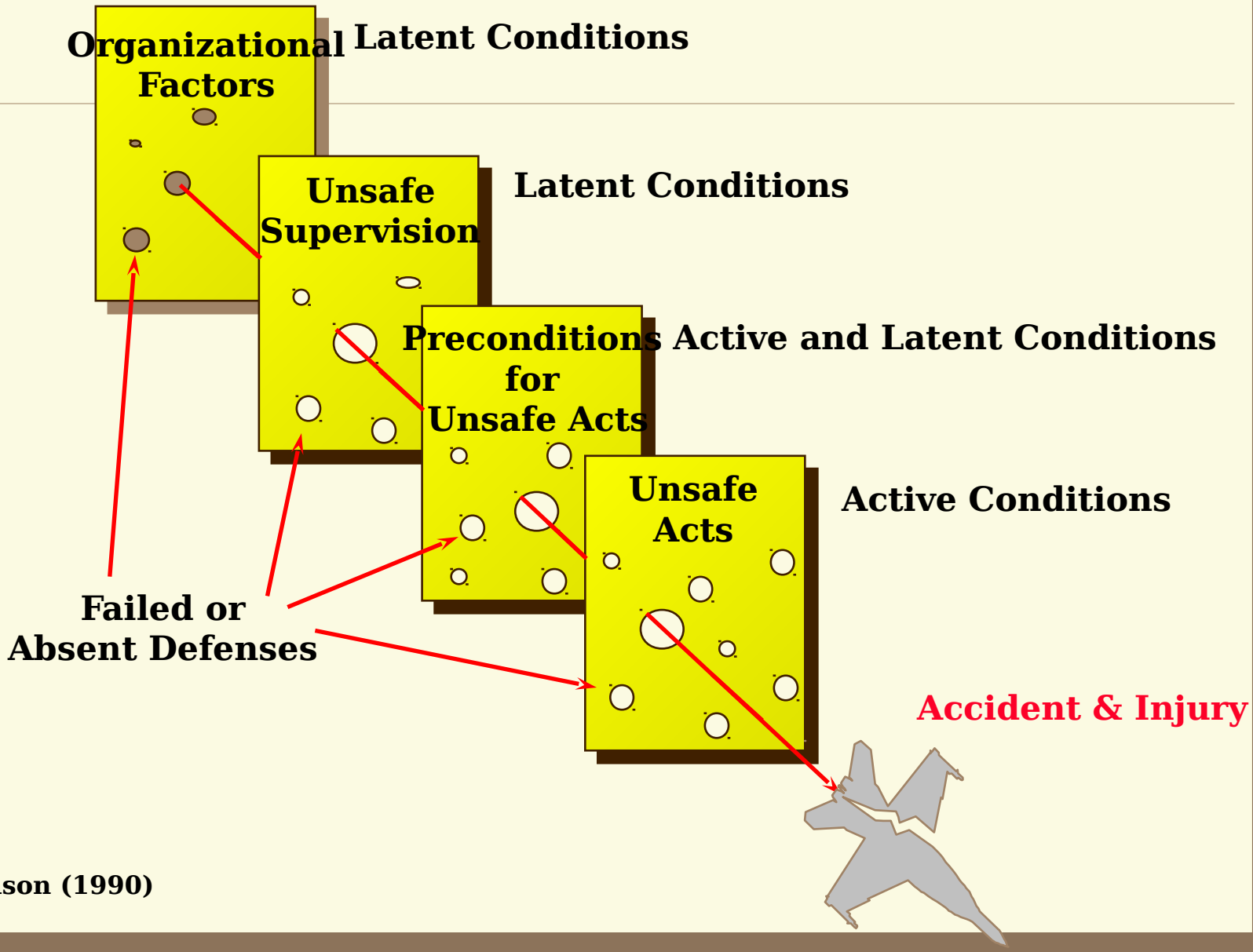
Working together:

Common Strategy for Accident Prevention

- ✔ **Data Analysis**
- ✔ **Data-Driven Plan**

Conclusions from CAST/JSAT/JSIT Process:

- **Commercial air travel is safe, but additional improvements must be made because of the projected increase in traffic in future years.**
- **All participants in the global aviation system must work together.**
- **Our efforts must be data driven and integrated into a single strategy.**
- **We must communicate industry and government safety processes and initiatives.**


Organizational Factors
Latent Conditions
Unsafe Supervision
Latent Conditions
Preconditions for Unsafe Acts
Active and Latent Conditions
Unsafe Acts
Active Conditions
Failed or Absent Defenses
Accident & Injury

Reason (1990)

Company culture and policies

Communications w/in the company

Maintenance practices

Are the controls w/in reach?

Are warning labels/alarms conspicuous?

Working environment conductive to good communictions/ teamwork activities?

Does everyone involved in the system have all the required information, training, and experience needed

Is the mission beyond the scope of the crew, aircraft, or other systems required for safe completion?

DOT/FAA
HF
Training

Questions?
Thanks!